VOLCANO PARTNERS LLC

Empire State Building, 350 Fifth Avenue, Suite 5310, NY, NY 10118

September 6, 2016

Ms. Kristine Koch
Remedial Project Manager
U.S. Environmental Protection Agency – Region 10
805 SW Broadway
Suite 500
Portland, Oregon 97205

VIA ELECTRONIC MAIL
harborcomments@epa.gov

Subject: Comments to United States Environmental Protection Agency Region 10 Regarding the Proposed Plan for the Portland Harbor Superfund Site

Dear Ms. Koch:

Volcano Partners, LLC (Volcano Partners) appreciates the opportunity to provide comments on the Superfund Proposed Plan for the Portland Harbor Superfund Site, Multnomah County, Oregon (PRAP) published by the United States Environmental Protection Agency (USEPA), Region 10 on June 8, 2016.

Volcano Partners supports the selection of thermal processing as a treatment/disposal integrated option in the PRAP. However, we are now seeking a clarification of the available thermal treatment options discussed in the PRAP. Specifically, we are requesting that EPA identify high temperature thermo-chemical processing of sediments in the production of cement admixtures as a beneficial use as an available treatment/disposal option. As discussed in more detail below, this type of thermal treatment meets the evaluation criteria of the Feasibility Study and PRAP and would be an effective and cost-competitive treatment/disposal alternative to thermal desorption, or disposal in a C landfill for inclusion in the ROD.

Innovative sediment treatment technologies that manufacture beneficial use products are viable and continue to be of public interest when disposal to landfills (that includes long distant transport) are perhaps not the best sustainable outcome for these contaminated sediments. Volcano Partners, LLC would request USEPA to please consider in more detail the viability of applying a demonstrated thermal destruction process that manufactures a beneficial use product to be a component of an integrated contaminated sediment management program for the remediation of the Portland Harbor Superfund Site.

I. Volcano Partners Requests High Temperature Thermo-Chemical Processing of Sediments in the Production of Cement Admixtures as a Treatment/Disposal Option in the Record of Decision

Volcano Partners is the owner of the patented Cement-Lock® manufacturing process. Cement-Lock® uses a high temperature thermo-chemical process that effectively destroys organic contaminants in dredged sediments, including petroleum aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), and immobilizes any remaining metals in a beneficial use product, Ecomelt®, that serves as a substitute (up to 40% replacement) for portland cement in the production of concrete. The Cement-Lock® manufacturing facility also captures waste heat from the manufacturing process to generate electricity for use by the facility.

The contaminants of concern (COCs) to human and ecological health in the sediments at the Portland Harbor Superfund Site include PAHs, PCBs, dioxins/furans, and DDT. According to the PRAP, portions of the site contain concentrations of these constituents, particularly PCBs, that may exceed the capabilities of thermal desorption as a suitable treatment technology. The PRAP acknowledges that treatability testing will be required to identify appropriate handling and disposal options for sediments from those portions of the site.

The Cement-Lock® manufacturing process would effectively destroy, immobilize in a beneficial use product, or capture in air pollution control (APC) equipment any and all of these identified COCs without the need for additional treatability testing. We believe that the Cement-Lock® manufacturing process is an effective and cost-competitive treatment/disposal alternative for the Portland Harbor Superfund Site. Therefore, we are requesting that USEPA identify high temperature thermo-chemical processing of sediments in the production of cement admixtures as an available treatment/disposal option in the ROD.

II. Cement-Lock® Manufacturing Technology Delivers Sustainable, Integrated Sediment Management

The Cement-Lock® manufacturing technology is a sustainable, integrated sediment management system that supports Remedial Action Objectives (RAOs) for the Portland Harbor Superfund Site and USEPA guidance supporting the use of innovative, sustainable technology. USEPA guidance[1] urges project

[1] United States Environmental Protection Agency. 2005. *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*. OSWER 9355.0-85.

managers to utilize innovative technology when such technology offers the potential for comparable or superior treatment performance or implementability, fewer or lesser adverse impacts than other available approaches, or lower costs for similar levels of performance than demonstrated technologies. Additionally, in the course of manufacturing products for which there is a market demand, the Cement-Lock® process meets USEPA treatment criteria for PCBs and dioxins/furans which are COCs in Portland Harbor.

Cement-Lock® is a thermo-chemical manufacturing process that produces a high quality pozzolanic material, called Ecomelt®, by using contaminated sediment as a manufacturing process feedstock. Ecomelt® can replace up to 40 percent of portland cement in concrete production. Construction grade cement composed of Ecomelt® and portland cement is suitable for general construction purposes at lower costs than portland cement alone.

The Cement-Lock® manufacturing process was developed by the Gas Technology Institute, Des Plains, IL, (GTI) under a contract with the U.S Department of Energy Brookhaven National Laboratory (BNL), funded by the federal Water Resources Development Act (WRDA) and the USEPA Region 2 Superfund Program. Additional funding and project management support was provided by the New Jersey Department of Transportation, Office of Maritime Resources and the Gas Research Institute, Des Plaines, IL (GRI). A demonstration plant was constructed at the International Matex Tank Terminal, Bayonne, New Jersey. Demonstration tests conducted in 2005 through 2007 successfully produced Ecomelt® from sediment from the lower Passaic River, New Jersey, Newtown Creek, New York and Detroit River, Michigan Superfund sites.

The Cement-Lock® manufacturing process is specifically designed to use contaminated dredged materials as a feedstock raw material for the production of Ecomelt®. After dewatering, the sediments are processed into a homogeneous “filter cake”. The patented technology combines the “filter cake” with calcium, aluminum and silica additives necessary for production of a pozzolanic cementitious material. The mix is then run through a high temperature manufacturing process (a natural gas-fired slagging rotary kiln). This process produces a molten mixture that is then quenched in a water bath to create a beneficial use product, Ecomelt®.

The high temperature (2400° to 2600° F) involved in the manufacturing process to create Ecomelt® has the benefit of destroying organic contaminants present in the feedstock, achieving DRE’s of 99.9999+ for compounds such as PAHs, PCBs and dioxin/furans. The thermo-chemical manufacturing process also effectively immobilizes inorganic contaminants, such as metals, in the pozzolanic matrix found in Ecomelt®. Mercury, lead and other volatilized metals are captured in the APC system, as designed by Foster Wheeler Corporation and described in detail in the attached paper presented and published in the Proceedings of the 33rd International Conference on Thermal Treatment Technologies & Hazardous Waste Combustors October 13-15, 2014 - Baltimore, Maryland USA. Ecomelt® is collected from the kiln as vitreous glass beads and milled/pulverized for blending with portland cement for use in concrete.

As described in detail by the 2008 WRDA final report[2], leaching tests conducted during the course of the demonstration project concluded that Ecomelt® readily passed USEPA Toxicity Characteristic Leaching Procedure (TCLP). Ecomelt® can be blended with ordinary portland cement at a 40:60 (Ecomelt® to portland cement) weight ratio.[3] This use is consistent with ASTM C595 (Standard Specification for Blended Hydraulic Cements) and confirmed by the pilot and demonstration project test results. In 2008, a batch of concrete using Ecomelt®, made from lower Passaic River sediments, was used for a length of sidewalk at Montclair State University, Montclair, New Jersey.[4] The sidewalk today still exists and has shown great resilience over time as well as campus wear.

Under this technology option, the Portland Harbor sediments would be screened, dewatered and processed at a single site located in the Portland Harbor waterfront complex. Sediment would be offloaded from barges and mechanically screened for debris and oversized material. Debris would be washed and disposed in a landfill. Screened sediment would be run through hydrocyclones to remove sand for recycling. The fine material would be dewatered using membrane filter presses. Ecomelt® would be manufactured from the resulting "filter cake". Finally, the Cement-Lock® manufacturing facility captures waste heat from the manufacturing process to generate electricity for use by the facility.

III. Cement-Lock® Manufacturing Technology Meets the Evaluation Criteria for Treatment/Disposal Established in the Feasibility Study and PRAP

As discussed above, the use of Cement-Lock® manufacturing technology supports the RAOs established for the Portland Harbor Superfund Site including the protection of overall human health and the environment and the achievement of applicable or relevant and appropriate standards (ARARs). Cement-Lock® also meets the additional evaluation criteria set forth in the Feasibility Study and PRAP, including short-term effectiveness, long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, implementability, cost, acceptance and sustainability.

A. Short-Term Effectiveness

Cement-Lock® manufacturing technology would centralize processing and treatment of the Portland Harbor contaminated sediments into a single location, minimizing handling and transportation (both rail and truck), as well reducing the risk of releases. While meeting required performance specifications, this approach reduces potential impacts to the community, including the reduction of noise and levels of traffic, and dust and odors during the handling, processing and disposal of contaminated sediment. The

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[2] Mensinger, M, 2008. *Sediment Decontamination Demonstration Program – Cement-Lock® Technology Final Report: Phase II Demonstration Tests with Stratus Petroleum and Passaic River Sediments.* Endesco Clean Harbors, Inc., July 2008.

[3] Rehmat, A.,A. Lee, A. Goyal, and M.·C. Mensinger,1999. *Construction-Grade Cement Production from Contaminated Sediments Using Cement-Lock Technology* . http://www.bnl.gov/wrdadcon/publications/reports/igt-weda-5-99.pdf

[4] Mensinger, M.,2008. *Cement-Lock® Technology for Decontaminating Dredged Estuarine Sediments Topical Report on Beneficial Use of Ecomelt® from Passaic River Sediment* at Montclair State University, New Jersey. Gas Technology institute, Des Plains, IL., 2008.

APC equipment and monitoring instrumentation for lime injection, carbon absorption, NOx capture and stack emissions control have been demonstrated to be fully compliant with all applicable APC standards.

Specifically, the Cement-Lock® manufacturing technology can simplify the remedy and improve the short-term effectiveness of the remedy as follows:

- Because Ecomelt®, the end product of the Cement-Lock® manufacturing process, is a replacement for portland cement that would be used locally, truck trips associated with the mining, processing and transport of raw materials for cement manufacturing of an equivalent volume of Ecomelt® for local construction would be eliminated.
- Process heat from the Cement-Lock® manufacturing process can be captured and used to co-generate electricity to run the facility with a balance available for export to the grid.

B. Long-term Effectiveness and Permanence

The very nature of the higher temperatures involved by the Cement-Lock® manufacturing process, as demonstrated in the WRDA Demonstration Project by the USEPA Region 2, in conjunction with BNL, can improve the long-term effectiveness and permanence of the remedy, minimizing potential exposure pathways and long-term risks. Specifically,

- The Cement-Lock® manufacturing process uses high temperatures that effectively destroy all organic constituents, including PAHs, PCBs and dioxins/furans.
- The non-volatilized metals are immobilized within the Ecomelt® matrix. TCLP test results have demonstrated the immobility of metals in Ecomelt®.[5]
- Lead and other metals volatilized by the high temperature process would be captured by the APC system.
- The mass of contaminants transferred from the Portland Superfund Site to landfills would be sharply reduced. Only residual material recovered from the baghouse of the APC system, containing a small fraction of original contaminant load found in the in situ volume of dredged sediments would require landfilling. Volcano Partners is actively reviewing recycling options that would eliminate the need to landfill even this small fraction of contaminants found in APC residual.

C. Reduction of Toxicity, Mobility, or Volume Through Treatment

The ability to destroy organics and immobilize metals in the course of manufacturing marketable products from dredged material is the strength of this alternative treatment option. Specifically,

- The high temperatures involved in the manufacturing process irreversibly destroy all organic contaminants, achieving 99.9999+ percent DREs for PAHs, PCBs and dioxins/furans;

[5] Mensinger, M, 2008. *Op.cit.*

- Metals are immobilized in the Ecomelt® pozzolanic matrix. TCLP analyses on Ecomelt® meet EPA and State standards;
- The material dredged from the Portland Harbor Superfund Site would be used as a feedstock to produce Ecomelt® for use as a portland cement replacement;
- All sediment recommended to be dredged by the PRAP, regardless of COC concentrations, is acceptable feedstock for the Cement-Lock® process for manufacturing Ecomelt®; and

D. Implementability

After the successful manufacture of Ecomelt® from the lower Passaic River, New Jersey, Newtown Creek, New York and Detroit River, Michigan Superfund sites was demonstrated during the WRDA Demonstration Project by the USEPA Region 2, BNL and the GTI, operational enhancements were made to the feedstock delivery and APC systems by Foster Wheeler Corporation. AMEC/Foster Wheeler Corporation specializes in the design of high temperature rotary kilns and has over nine facilities currently active in the United States, including the Aragonite, Utah facility that successfully treated contaminated sediments from the lower Passaic River Phase 1 Removal Project in 2012.

Cement-Lock® utilizes established technology comprised of components whose efficacy and reliability have been proved by more than 20 years of operational experience. The uniqueness of the Cement-Lock® manufacturing process lies in the additives, the mixture ratios and residence times used to manufacture Ecomelt®, rather than in the thermo-chemical processing equipment. All mechanical systems are "off-the-shelf" and in widespread use worldwide. Foster Wheeler's proprietary rotary kiln designs readily scale-up to meet the removal requirements of the Portland Harbor Superfund Site. As we outlined above, all contaminated sediments from the Portland Harbor Superfund Site are suitable for the Cement-Lock® manufacturing process. Therefore, the uncertainties arising from the potential suitability of the dredged material, given the limitations of thermal desorption, are eliminated. Finally, processing and treating the dredged material in a single off-site location would reduce the impacts to the affected community resulting from implementation of the remedy.

E. Cost

The use of the Cement-Lock® manufacturing technology reduces overall implementation and long-term costs in several ways:

- The costs for identifying and implementing alternative treatment or placement technologies for material unsuitable for thermal desorption are avoided. All organic COCs can be treated to 99.9999+ percent DREs and remaining metals would be immobilized in the end product, eliminating the need and costs to investigate and utilize additional treatment/disposal technologies for material unsuitable for thermal desorption.

- Costs for transportation would be avoided as the material would be dewatered and processed at a single location. Cost for transportation from the processing facility to a landfill would be sharply reduced.
- Long-term liability costs are sharply reduced or eliminated. As the volume of material requiring placement in a landfill would not be increased by the addition of portland cement for dewatering, the long-term insurance, monitoring, bonding and other costs associated with placement in a landfill would be nearly eliminated.
    - Cement-Lock® processing dramatically reduces pollutant mass, toxicity, mobility associated with contaminated sediments. CERCLA Section 121 "prefer[s]" treatment that "reduces the volume, toxicity or mobility of … the contaminant." 42 U.S.C. Sec. 9621(b)(1). Landfills, Confined Disposal Facilities (CDFs) and Confined Aquatic Disposal Cells (CADs) merely push the legacy liability into the future.

F. Sustainability

The Cement-Lock® manufacturing process is consistent with USEPA's Clean and Green Policy that promotes a more sustainable approach to remediation. The Cement-Lock® manufacturing process is the result of the unprecedented 20-year effort by USEPA Region 2 and public and private stakeholders to identify and deploy a sustainable, green technology capable of producing a beneficial use product from contaminated dredged sediments. Specifically,

- The Cement-Lock® facility uses natural gas for the manufacturing process and waste heat for cogeneration;
- Energy used in the manufacturing process would be captured through cogeneration to run the manufacturing facility and exported to the electrical grid;
- The end product of the manufacturing process would be a high quality pozzolanic material that would be beneficially used as a cement admixture to substitute with a portion of portland cement in the production of concrete for construction projects. This process virtually eliminates any need for landfilling of contaminants. Nearly the entire volume of contaminated dredged material would be used in the production of non-hazardous building materials, including sand and Ecomelt®, a pozzolanic cement admixture, for local construction use; and
- Greenhouse gas emissions would be reduced by the elimination of truck/rail transport and by the offset of CO_2 emissions resulting from the beneficial use production of a portland cement replacement and electricity associated with the Cement-Lock® facility. For each ton of Ecomelt® produced, a Cement-Lock® facility eliminates one ton of CO_2 produced by the portland cement industry.

We look forward to working with you and your staff, and the PRPs and other stakeholders, to establish an effective and cost competitive treatment/disposal plan for the Portland Harbor Superfund Site. We would be happy to provide any additional information you may need regarding the Cement-Lock® manufacturing process, or to meet with you or your staff to answer any questions.

Sincerely,

Walter “Al” Hendricks
Chairman / Managing Member
(407) 492-9731
www.cement-lock.com

Attachments (1):

Thermal Treatment for Reclamation and Beneficial Use of Contaminated Sediments